Motor Supply Accident

Instructor's Copy

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[1] This exercise was developed and field tested under U. S. Bureau of Mines research contract no. H0348040. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or recommendations of the Interior Department's Bureau of Mines or the U. S. Government.

Contents

Introduction

This document contains most of the materials needed to use the exercise. The main part of the document is the instructor's copy. It tells how to use the exercise, presents the objectives, the master answer sheet, the scoring key, and discussion notes to be used following the exercise. The last part is three appendices. Appendix A is the exercise problem booklet. This booklet can be duplicated locally. The booklets are reusable. One is needed for every person in the classroom. Appendix B is the answer sheet. Copies of this answer sheet must have the invisible ink answers that appear in Appendix C printed on them[2]. Answer sheets are consumable. One is needed for each group of 3 to 5 persons who work the exercise.

Exercise Summary

Read this section first. It determines if the exercise is appropriate for your classes. If you choose to use the exercise, examine the table of contents and review the remainder of this document.

Type:	Invisible ink
Audience:	Underground coal miners
Length:	Thirteen questions (35 minutes for administration plus 40 for discussion)
Skill:	Anticipate and prevent a dangerous haulage situation from developing into an accident Minimize the consequences of an accident once it has occurred by preventing further errors and injuries Extract a victim caught in a coupling between a supply car and a locomotive without causing further injury Provide first aid treatment for shock, bleeding, and a large chewing type wound
Location:	Underground
Problem:	Thurman "Hap" Anderson brings some supplies to a section. Cal meets him by a supply car on the section. Both Hap and Cal exhibit some unsafe work practices. An accident develops and quickly gets out of hand. Your job is to watch it and to predict what will happen and think about how the accident could have been avoided. Then you must decide how Cal should be freed from the coupling, what first aid he needs and how to care for him.

[2] You can do this yourself if you have the proper equipment, or you may obtain copies of preprinted answer sheets from MSHA, National Mine Health & Safety Academy, Dept. of Instructional Materials, 1301 Airport Road, Beaver, WV 25813-9426 phone 304-256-3257, fax 304-256-3368 or email to lord-mary@msha.gov.

How To Use This Exercise

1. Look at the performance objectives. Decide if the exercise is relevant for your mine training class.

2. Work through the exercise with the developing pen and score your responses.

3. Read the master answer sheet for the exercise. Look at all the answers.

4. Read the "Instructors Discussion Notes" for the exercise.

5. Become thoroughly familiar with the problem so that you can present it to your class without reading it. Put the maps on an overhead projector so you can use these to help explain the problem.

6. When you present the exercise to the class:

    - Give each person an exercise booklet, and each group of 3 to 5 persons one answer sheet and a developing pen.

    - Demonstrate how to select and mark answers using the developing pen.

    - Go over the instructions for doing the exercise with the whole group.

    - Explain the problem making sure everyone understands the problem situation.

    - Have the class members work the exercise.

    - When the class members finish, have them figure up their score using the instructions at the end of the exercise.

    - When everyone has finished, discuss the exercise. Let class members discuss the merits of each answer. Add your own ideas.

Performance Objectives for Motor Supply Accident

Objective number		Capability verb(s)	Description of required performance and conditions under which it is to occur
1.	EE[3]	Predict Anticipate	The occurrence and likely effects of an impending mine haulage accident given a description of operator actions and a sequence of local events
2.	EE	Recognize Identify Evaluate	Positions and actions that place self and others at risk when working with or around track haulage equipment
3.	EE/FA	Recognize Identify Judge	Actions that can lessen or worsen the progression of a track haulage accident and the injuries to victims
4.	EE/FA	Identify Anticipate Evaluate	The probable effects and consequences of actions intended to free a victim entangled in track haulage equipment
5.	EE/FA	Order Arrange	A sequence of actions to remove a victim caught in track haulage equipment while minimizing further injury to the victim and the rescuers
6.	FA	Identify Recall Select	First aid procedures for helping a victim entangled in equipment prior to his or her extraction
7.	FA	Recall Select	Procedures for conducting a primary and secondary survey
8.	FA	Order Select	First aid diagnostic and treatment procedures in terms of priorities
9.	FA	Recall Recognize Select	Proper procedures for controlling bleeding, bandaging wounds, diagnosing and immobilizing fractures, and diagnosing and treating shock
10.	FA	Recognize Evaluate Select	Communications to others by first aiders that clearly and accurately describe the location and nature of the accident, the name of the caller, the needs of the victim, and the needs of the first aider(s)
11.	FA	Recognize Evaluate	Actions and statements that appropriately direct the efforts of other miners in assisting first aider(s) in caring for a victim

[3] Skill and knowledge domain abbreviations:
EE - emergency evacuation and escape
FA - first aid

Master Answer Sheet for Motor Supply Accident

Use this answer sheet to mark your selections. Rub the developing pen gently and smoothly between the brackets. Don't scrub the pen or the message may blur. Be sure to color in the entire message once you have made a selection. Otherwise you may not get the information you need.

Question A (Choose only ONE unless you are told to "Try again!")

1. [Try again!]

2. [Try again!]
   [ ]

3. [Try again!]

4. [Correct. Hap has the tram control on point 3, he has not reversed the motor,]
   [and he has the deadman switch held down. Do the next question.]

5. [Try again!]

Question B (Choose only ONE unless you are told to "Try again!")

6. [Try again!]

7. [Try again!]

8. [The three feet of wire between the harp and the end of the trolley line will]
   [supply enough power to get the locomotive rolling fast. Try again!]

9. [Try again!]

10. [Correct. Nothing Hap can do will be fast enough to prevent the accident. Cal]
    [can't move fast enough to get out of the way. The time to prevent the accident]
    [is now past. Do the next question.]

Question C (Choose only ONE unless you are told to "Try again!")

11. [Would take too long. Cal may need help fast. Try again!]

12. [When Hap does this, the locomotive trams backwards (inby) again, further]
[crushing Cal. The motor still has not been reversed, the control lever is still]
[in point 3, the deadman switch is still under the bag of rock dust. Try again!]

13. [Hap does all this. But the coupling between the locomotive and the supply car]
[has engaged. When Hap pulls ahead, the supply car runs over Cal. Try again!]

14. [Correct. Hap finds the coupling between the locomotive and the supply car has]
[hooked up. Cal's leg and pants are stuck in the coupling. If Hap had first tried]
[to move the locomotive he could have hurt Cal worse. Do the next question.]

15. [Cal continues to scream and struggles to free his legs, but can't get out.]
[Hap's advice is bad. He should stay with Cal. Try again!]

Question D (Choose only ONE unless you are told to "Try again!")

16. [Correct. Hap sees both legs. The coveralls on the left leg are soaked with]
[blood from the coupling down to Cal's boot. The calf of the leg is stuck in the]
[coupling. There is no blood visible on the right leg which is pinned just below]
[the knee between the supply car and its tongue. Do the next question.]

17. [Not yet. There is something more important that needs to be done first. Try]
[again!]

18. [When Hap does this, it pulls the supply car too, and Cal cries out. Try again!]

19. [No need to. He is yelling and screaming. There is something more important]
[that needs to be done. Try again!]

20. [Hap can't. The trolley pole is off the trolley wire. He needs to do something]
[else first. Try again!]

Question E (Choose only ONE unless you are told to "Try again!")

21. [Hap can't. The wound is covered by the coupling. Try again!]

22. [Correct. It may take some time to free Cal. He could bleed to death. His bleeding must be controlled. Do the next question.]

23. [Because of Cal's heavy pants and coveralls, Hap can't be sure he's found the pressure point. He can't see if his pushing slows the bleeding. The coupling is in the way. Also, he can't get help. Try again!]

24. [Cal says he can't sit down. He tells Hap to get him out. This is a poor choice. Try again!]

25. [Hap does this, but the bleeding doesn't slow or stop. The leg wound is inside the coupling. This it a poor choice. Try again!]

Question F (Choose only ONE unless you are told to "Try again!")

26. [Correct. Now is the right time to call for help and the trolley phone is the fastest way to do so. But Hap forgot to say who he is, where he is, and who is hurt. The mine is large. Others may not know where to send help. Do the next question.]

27. [Try again!]

28. [Calling for help was the right thing to do at this time. But, there is a problem. Try again!]

29. [Hap couldn't call before he put the trolley pole on the wire again. And he needed to control Cal's bleeding first. Try again!]

30. [He may need help in getting Cal out. He knows he is stuck tight. It won't take long to call for help. Getting help is important. Try again!]

Question G (Choose only ONE unless you are told to "Try again!")

31. [There is something else more critical. Try again!]

32. [This stops the bleeding but will cause further injury. Your action may cost]
[Cal his leg. Try again!]

33. [Correct. This will help control the bleeding. Do the next question.]

34. [This causes Cal to scream. Then he passes out. Your action hurt him more.]
[Try again!]

35. [You do so, but it hurts him. He continues to bleed. Your action wastes time]
[and contributes to his injuries. Try again!]

Question H (Choose only ONE unless you are told to "Try again!")

36. [When you do he starts bleeding hard again. Try again!]

37. [Correct. It is important to maintain the pressure to control the bleeding and it]
[is important to tell Cal what you are doing and why. Do the next question.]

38. [When you do, the dressings fall out of place and Cal starts bleeding again.]
[This action harms him! Try again!]

39. [Now you can't see if his leg is bleeding, or if the pressure bandages stay in]
[place. He may bleed more and die. Try again!]

40. [Cal needs more help first. This is dangerous. He may die before you get him]
[out. He may have other problems. Try again!]

Question I (Choose only ONE unless you are told to "Try again!")

41. [Correct. You have now controlled his bleeding. The extra dressings and the]
[cravats will maintain direct pressure. Do the next question!]

42. [Cal coughs and thrashes around. You have increased his pain. You should]
[calm him, not annoy him. Try again!]

43. [His left leg starts to bleed again. You should keep the direct pressure on the]
[wound while directing someone else to cut his other pants leg. Try again!]

44. [As soon as you start moving him, his leg starts bleeding real bad. Your]
[actions have harmed him. Try again!]

45. [As you slip the air splint over his leg, you dislodge the dressings in his wound.]
[His leg starts to bleed hard again inside the air splint. Try again!]

Question J (Choose only ONE unless you are told to "Try again!")

46. [You waste time doing this. It is not necessary. There is a more critical task]
[that needs immediate attention. Try again!]

47. [He says they are too tight and to loosen them. You should not loosen them]
[and you should not have asked him this question in the first place. Try again!]

48. [Correct. Do the next question.]

49. [When you do this, he gets upset, thrashes around, and screams. Your]
[actions have harmed him more. You need to comfort and calm him, not]
[torment and anger him. Try again!]

50. [Not necessary. Wastes time. Try again!]

Question K (Choose only ONE unless you are told to "Try again!")

51. [Not an immediate problem though you should always try to keep wounds as]
[clean as possible. Try again!]

52. [Not the immediate problem. This action chills him. Try again!]

53. [Correct. This simple treatment can save his life. Failure to do this could]
[lead to irreversible shock and later advanced life support treatment may not]
[help him. Do the next question.]

54. [Not his immediate problem. The finger sweep is unnecessary and will annoy]
[Cal. He is talking so his airway is open. If he passes out he will likely]
[continue to breathe. Artificial respiration would be harmful. Try again!]

55. [Not his main problem. Your actions would not help him and might hurt.]
[Try again!]

Question L (Select as MANY as you think are correct.)

56. [Correct. Other locomotives and mantrips should be cleared. Also, the unit]
[supply train loading at the surface may block the access road to the mine.]
[If so, it needs to be moved. This will speed Cal's trip out.]

57. [Correct. He has been through a lot too. He fell from the locomotive. He]
[could have injuries that need attention. He could also suffer from shock.]

58. [Correct. It is important to answer the EMT's questions. But it is also important]
[to volunteer information not asked for by medical personnel. You helped]
[free Cal and have been giving him first aid. You may know other things]
[that the EMT should know.]

59. [Correct. The EMT will need helpers on the way out to operate the motor,]
[throw switches, help support the stretcher, etc. Hap should not operate]
[the locomotive.]

60. [This can make Cal vomit and deepen his shock. Do not do this! The EMT]
[would stop you if she saw you doing this. Try again!]

Question M

_____

_____

_____

_____

End of Problem

Finding your score

Number of "Correct" answers you colored in = 1) _____

45 minus number of incorrect answers you colored in = 2) _____

Add blanks one and two to get your total score = 3) _____

Highest possible score = 60

Lowest possible score = 0

Instructor's Discussion Notes for Motor Supply Accident

Use the information presented here and on the master answer sheet, your own ideas and experience, and that of the miners in your class to discuss the exercise after it is completed. Group discussion can strengthen knowledge and skills, correct errors, and relate the exercise content to the experiences of the miners. After they have worked the exercise, miners enjoy discussing the problem. They also frequently think of better ways to respond to a problem than those listed among the answers. The purpose of the exercise is to help miners think about and remember basic knowledge and skills they may someday need to deal with a mine emergency. The discussion following the exercise can contribute to this goal and tailor the exercise content to the needs of the group you are training.

It is helpful to show overhead transparencies of the answers on the master answer sheet during the discussion, while the miners look at their problem booklets. This allows you to lead the group through the exercise and to discuss all the answers to each question. Most of the information about why particular answers are correct or incorrect is given on the master answer sheet.

The following notes provide additional information for you to discuss with your class. Read through and think about the notes before the class. Incorporate the ideas you find here with your own ideas and make these points at the appropriate place in the discussion of the exercise.

Question A - The correct answer is 4. Accidents are sometimes defined as uncontrolled actions that lead to unanticipated events. Most accidents don't result in injuries. However in this situation, the locomotive suddenly and unexpectedly (for Hap and Cal) moved backwards.

This accident resulted in a serious injury. However, the sudden inby movement of the locomotive was predictable for Hap, if he had attended to his and Cal's actions and thought ahead. Motormen should know it is possible to accidentally bump the tram control lever. This is one reason the deadman switch should not be inactivated. Equipment operators should also routinely set the brake and pay attention to details like remembering to reverse direction. While Cal could not have predicted the movement of the locomotive (he didn't have all the information) he should have known better than to place himself between the locomotive and the supply car. In this position his well-being is dependent upon everything working perfectly and Hap making no errors. Hap should not have pulled up close to the supply car when Cal was between it and the locomotive. Hap should have refused to tram the locomotive away from the section until he warned Cal to move.

The series of events that occurred took Hap and Cal by surprise. This is how most accidents occur. As with most accidents, this one should have been anticipated by either Hap or Cal as it developed. Simple actions by either miner would have prevented the accident and injury. You and the class members might recall similar situations in which they and you have unknowingly allowed an accident to develop and progress when it could have easily been prevented at several stages.

Question B - The correct answer is 10. At this point, neither miner can respond quickly enough to prevent the accident. This is why it is important to anticipate a possible accident before it happens, when there is still time to stop it or lessen its impact.

Question C - The correct answer is 14. Immediately trying to move the locomotive to free Cal is a likely response in this situation. However, doing so would cause the accident to progress and the injuries to become more severe. At this point the accident is still taking place. What Hap and others do can stop the accident or help it continue. It is important to look at Cal and the equipment to see how badly he is injured, if and how he is caught in the coupling, and if the coupling is connected. This information is needed to make decisions about the next steps. Leaving Cal unattended while going for help would not be good either, because he might bleed to death. But it would be better than ramming him again or running over him with the supply car. If Hap is upset and shaken it might be better for him to go for help than to try to help Cal and hurt him more.

Question D - The correct answer is 16. At this point it is important to continue to gather information. Close examination of the coupling and Cal's legs is important. It could be that only Cal's coveralls were caught in the coupling and, he has no serious injury. Or Cal's left leg might have been amputated just below the knee. Or it could have been crushed. The next correct steps are different depending upon the situation. When Hap looks closely at the coupling and underneath the coupling at Cal's legs, he gets information needed to make decisions about what to do next. For example, when Hap finds Cal's left leg bleeding badly, it should be clear that stopping the bleeding is more important than going for help.

Question E - The correct answer is 22. Having found Cal's leg to be pinched in the coupling with a large chewing wound to the calf and a lot of bleeding, Hap faces a number of problems. Because the coupling is fastened it is unwise to inch the locomotive forward or backward. Either action could cause the coupling to do further damage, possibly severing Cal's leg or causing further injury to his right leg as well. It is also likely that Hap may not be able to undo the coupling by himself. In addition, when the coupling is unfastened, the release of pressure on the wound may cause very heavy bleeding. A constricting bandage applied snugly on Cal's left leg just above the coupling is the best way to control bleeding. Direct pressure is impossible because the wound is in the coupling. Applying pressure to the groin pressure point is unwise because of the thick clothing, Cal's position, and because the coupling prevents Hap from seeing the results of the direct pressure. Holding the pressure point would also prevent Hap from calling for help. He and Cal might be there a long time before others arrived.

Question F - The correct answer is 26. At this point it is important for Hap to get help. The fastest way is to use the trolley phone. To do so, Hap would have to put the trolley pole on the wire. Here again, he could make the errors of failing to reverse the motor, activate the deadman switch, and put the tram control lever in neutral. If so, he would perhaps kill Cal and would certainly hurt him. If unable to reach the trolley wire with the pole, Hap should take the scoop and tram inby to get help. When he calls on the trolley phone, Hap needs to say where he is, who he is, and what the problem is. In emergencies like this persons

calling for help often forget to give this information. The person answering such a call can help by asking for this information.

Question G - The correct answer is 33. When Cal's leg is freed, it may be expected to bleed faster because the pressure from the coupling will have been released. The most immediate need is to control his bleeding. The constricting bandage that is in place can be used, but the best means is by direct pressure. This should be done with the hand until another miner gets the first aid kit with the dressings from the locomotive. A likely problem in this situation is knowing where to apply pressure. Cal's coveralls, pants leg and the leg's flesh may all be mashed together. It may be hard to see where to apply the direct pressure. However, the bleeding may be controlled at the knee pressure point while another miner gets the coverall and pants leg cut so you can see where to apply direct pressure. Once the wound area is clearly revealed, sterile dressings should be packed firmly into the wound and held in place by hand until it's secured with cravats. Checking the neck pulse would not be the first thing to do. Why? Because of the bleeding you know he has a pulse. Using wire for a tourniquet is wrong. It would damage leg tissue and might cause Cal to lose his leg. If necessary the constricting bandage (possibly a miner's belt) just above his knee may be tightened. But wound packing and direct pressure remains the best choice. Turning Cal onto his back and propping up his head and shoulders would hasten and deepen his traumatic shock. It would also make it harder to see and treat his leg wound. Removing his left boot would cause unnecessary movement, possible further injury, and would waste time.

Question H - The correct answer is 37. At this point it is important to maintain direct pressure on the dressings. Letting up on the wound will cause more bleeding. Tying cravats loosely over the pressure dressings will not maintain pressure and the bleeding will start again. If you had nothing else, a coat or shirt might be used as part of the pressure bandage. But simply covering the pressure dressings with the coat or shirt will not effectively control the bleeding and will hide the wound. Additional bleeding would not be easily visible until much more blood was lost. It is also important to explain to Cal why pressure is being applied and that it must be maintained. You may wish to discuss what should be done if Cal refuses treatment. Finally, Cal should not be transported until the pressure dressing is firmly tied in place and his leg splinted.

Question I - The correct answer is 41. At this point it is important to add dressings on top of the ones in the wound and tie these in place with a cravat or two. The extra dressings will push on the earlier dressings and hold them in place, and maintain the pressure. Any clotting that has started will not be disrupted. After this is done Cal can be examined for other injuries and an air splint put on his leg.

Question J - The correct answer is 48. Now that the immediate bleeding problem is controlled, it is important to begin treating Cal for shock. You know beyond a doubt that he must be in shock because of the seriousness of the injury and the amount of blood loss.

Question K - The correct answer is 53. Cal's major problem at this point is traumatic shock. It results from blood loss and the pain of the injuries. Unless treated, Cal will soon

become worse and can die within a few minutes. The best treatment is to get him on a padded stretcher, elevate the foot end, then cover him with blankets for warmth, and provide him with psychological support. If the first aiders are calm and supportive it can help the victim a great deal. It also helps to talk to the victim and not about him to others.

Question L - The correct answers are 56, 57, 58, and 59. All the things listed are desirable except giving Cal water to drink. He may ask for water. Thirst is one sign of shock. But he may vomit if given water, losing more fluid and deepening his shock. It is especially important to answer the EMT's questions and volunteer information if she doesn't ask something the first aider thinks is important. Otherwise, the EMT may not learn about something that is important for Cal's care.

Question M - Some of the violations and poor practices include:

- Hap inactivating the deadman's switch
- Hap failing to set the brake
- Hap failing to warn Cal to get out from between the locomotive and the supply car
- Hap failing to check the controls of the locomotive before he put the trolley pole on the wire
- Cal placing himself in an unsafe position when the locomotive entered and prepared to leave the section

Can you find others?

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Stefanko. R. (1983). Coal mining technology theory and practice (Chapters 8 and 11). New York: Society of Mining Engineers.

For related track haulage accidents see the following reports.

Pauley, H. L. (1979). Report of investigation (underground coal mine) fatal powered haulage accident. Mine ID No. 46-01266, Boone County, WV. Mount Hope, WV: MSHA, District 4.

Saunders, R. T. (1986). Report of investigation (preparation plant) fatal powered haulage accident. Mine ID No. 46-03263, Raleigh County, WV. Mount Hope, WV: MSHA, District 4.

Zirkle, T. T., & McGilton, W. A. (1978). Report of investigation (underground coal mine) fatal haulage accident. Mine ID No. 33-00939, Belmont County, OH. St. Clairsville, OH: MSHA, District 8, Subdistrict Office.

Scoring Key for Motor Supply Accident

The correct answers are marked with an asterisk.[4]

Question	Answer Number				
A	1	2	3	4*	5
B	6	7	8	9	10*
C	11	12	13	14*	15
D	16*	17	18	19	20
E	21	22*	23	24	25
F	26*	27	28	29	30
G	31	32	33*	34	35
H	36	37*	38	39	40
I	41*	42	43	44	45
J	46	47	48*	49	50
K	51	52	53*	54	55
L	56*	57*	58*	59*	60

[4] This page is printed in large type so that it may be copied and used as an overhead transparency.

Appendix A: Problem Booklet

Duplicate this copy of the problem booklet for use in your classes. **Booklets should be printed on only one side of the paper.** Each person in your class should have a problem booklet while they are working the exercise. The problem booklets are reusable.

You may obtain a copy of the problem booklet from MSHA, National Mine Health & Safety Academy, Dept. of Instructional Materials, 1301 Airport Road, Beaver, WV 25813-9426 phone 304-256-3257, fax 304-256-3368 or email to lord-mary@msha.gov.

Motor Supply Accident

Problem Booklet

Instructions

Read the problem situation described on the next page. Next, answer each of the 13 questions. Do them one at a time. Don't jump ahead, but you may look back to earlier questions and answers. Some questions ask you to select all of the answers that you think are correct. Other questions ask you to select only one answer unless you are told to "Try again!" Follow the directions for each question.

After you have selected a choice to a question, look up its number on the answer sheet. Select your answer(s) to each question by rubbing the developing pen between the brackets on the answer sheet. A hidden message will appear and tell you if you are right. When you have finished, you will learn how to score your performance.

Background

This is an underground coal mine with a 450 foot shaft and an 84 inch seam.

There are 6 entries being driven.

They are 20 feet wide with pillars 60 feet on center.

Nine miners are working on this section.

The face is 27 crosscuts from north mains, and 3 miles from the elevator.

The nearest EMT is on the first left panel about 12 minutes away.

The locomotive is 10 tons with five tram speeds (point 1 is low and point 5 is high).

Problem

Thurman "Hap" Anderson, motorman, brings a box of continuous miner cutter bits to the second panel left off the north mains. Cal, the unit supply man, leaves the face area and trams a scoop down to crosscut 21. Cal loads some roof bolts onto the scoop. Then he waits for Hap by the supply car that sits at the end of the track. See Figure 1. Hap pulls the locomotive to within five feet of the supply car. He puts the tram control lever in neutral. He forgets about the bag of rock dust holding down the deadman switch. (He put it there because he has a sore leg.) Hap gets off and hands the box of cutter bits to Cal. Hap gets back on the locomotive and prepares to leave. He intends to reverse the motor direction after repositioning the trolley pole on the wire. As he swings the trolley pole around, without realizing it, he bumps the tram control lever into point 3. As Hap starts to place the harp on the trolley wire, Cal is leaning against the outby end of the supply car watching him. See Figure 2. After studying Figures 1 and 2, turn to page 6 and answer the first question.

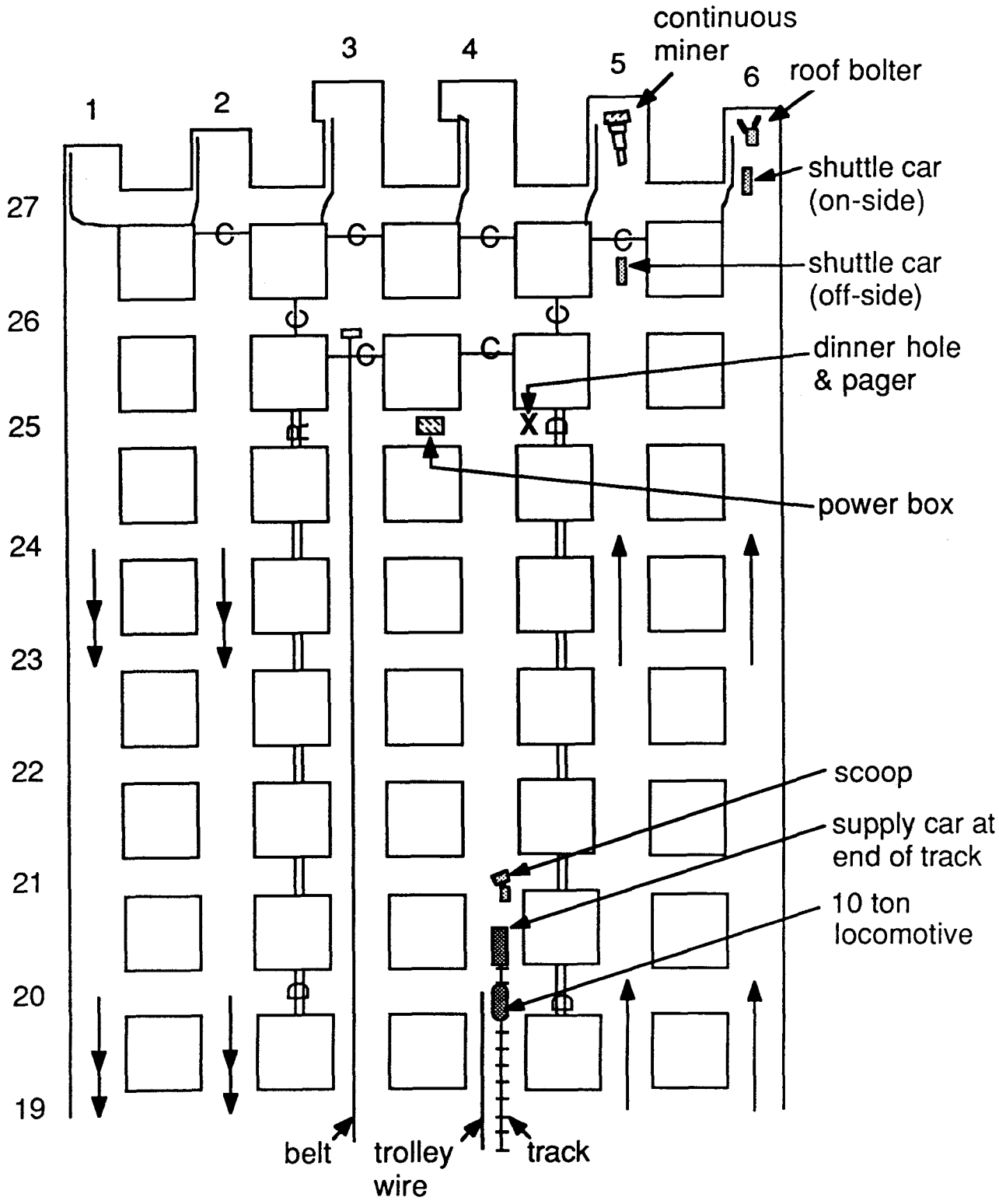

Figure 1: Details of second panel left, off north mains

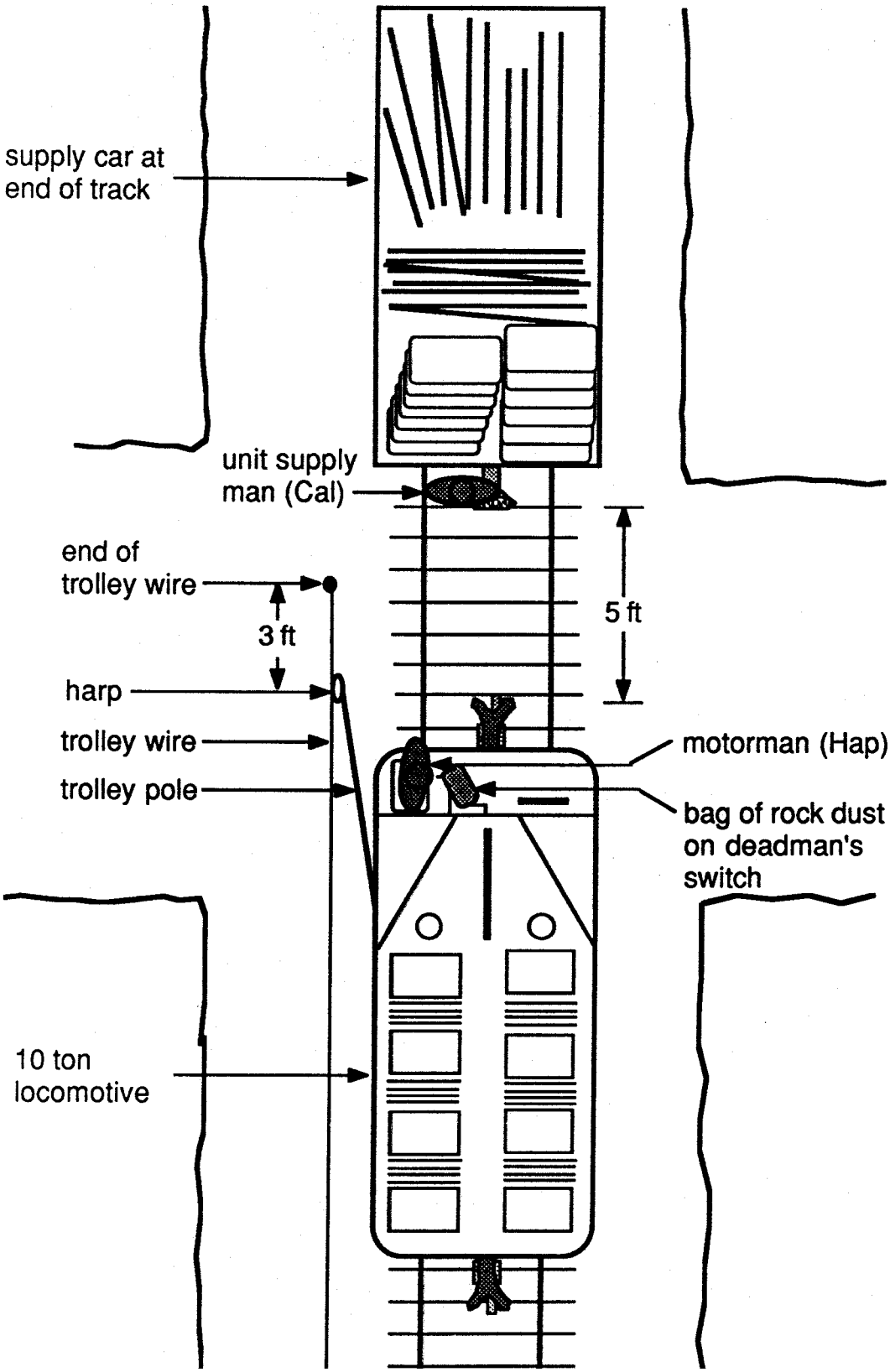

Figure 2: Top view of locomotive, supply car, and Cal's and Hap's positions

Question A

What will happen as soon as Hap puts the harp on the trolley wire? (Choose only ONE unless you are told to "Try Again!")

1. Nothing. The locomotive will remain at rest until Hap starts it up.
2. The locomotive will jump ahead (outby) rapidly and tram down the track.
3. The locomotive will move ahead (outby) slowly and tram down the track.
4. The locomotive will jump backwards (inby) rapidly.
5. The locomotive will creep backwards (inby) slowly.

Question B

As soon as the harp touches the trolley wire, the locomotive suddenly moves backwards (inby) toward Cal and the supply car. Which one of the following statements is true? (Choose only ONE unless you are told to "Try Again!")

6. If Hap acts fast, he can hit the brake or reverse the motor and avoid running into Cal and the supply car.

7. If Cal is alert he has time to jump out of the way so he won't be pinned.

8. The locomotive will stop before it hits Cal and the supply car because it will run out of trolley wire.

9. If Hap immediately pulls the trolley pole off the trolley wire, the locomotive will stop.

10. The locomotive will crash into Cal and the supply car.

Question C

As soon at the harp touches the trolley wire, the locomotive jumps back (inby) striking Cal and the supply car. The impact throws Hap from the operators compartment onto the mine floor under the trolley pole. The fall stuns him. As he comes to, Hap hears Cal screaming. What should Hap do now? (Choose only ONE unless you are told to "Try Again!")

11. Get up. Tram the scoop up toward the dinner hole and get help.

12. Get up. Swing the trolley pole around the other way (facing outby) so the harp touches the wire. This will give power to the locomotive and allow Hap to pull it away from the supply car.

13. Get up. Get on the locomotive. Reverse the motor. Free the deadman switch. Then swing the trolley pole around the other way (outby) so the harp touches the wire. Then tram outby to free Cal.

14. Get up. Go over to Cal. Look at him and the equipment. Try to find out how badly he is hurt and if he is caught in the equipment.

15. Get up. Tell Cal to try to free himself while Hap gets the first aid kit.

Question D

Hap decides to take a close look at Cal, who is yelling and screaming. Cal says his left leg is numb and his right leg hurts. His left pants leg and some of the flesh on the rear of his leg just below the knee is caught between the couplings. The tongue on the supply car coupling is cocked to one side and has jammed Cal's right leg between it and the front of the supply car. What should Hap do now? (Choose only ONE unless you are told to "Try Again!")

16. Look underneath the coupling at Cal's feet and legs.

17. Leave Cal there and tell him you are going for help. Take the scoop and tram inby to the dinner hole and get help.

18. Get on the locomotive. Put the control lever in neutral. Free the deadman switch. Reverse the motor. Swing the trolley pole outby and put the harp on the wire. Hold the brake on and inch the locomotive ahead (outby) to free Cal.

19. Check Cal's airway.

20. Get on the locomotive. Call for help on the trolley phone.

Question E

Now that Hap sees that Cal's left leg is stuck in the coupling and is bleeding a lot, what should he do? (Choose only ONE unless you are told to "Try Again!")

21. Apply direct pressure to the wound in the calf of Cal's left leg.

22. Apply a constricting bandage to Cal's left leg just above where it is stuck in the coupling.

23. Apply pressure with his fingers to the pressure point in Cal's left groin.

24. Try to make Cal comfortable. Give him some water to drink. Try to get him to sit down on the coupling.

25. Apply a constricting bandage just below the point where Cal's leg is caught in the coupling.

Question F

Hap gets on the locomotive. He puts the tram lever in neutral and sets the brake. He removes the bag of rock dust from the deadman switch. Next he swings the trolley pole outby and puts the harp on the trolley wire. It just barely reaches. Now Hap calls for help on the trolley phone. He says, "Help! Help! We got a man caught between a motor and a supply car. He's hurt. Come quick!" Was this a good thing for Hap to do at this time? (Choose only ONE unless you are told to "Try Again!")

26. Yes, it was right to call for help, but Hap's message is incomplete.

27. Yes, it was right to call for help and Hap's message is fine.

28. No, there was something else Hap should have done first.

29. Yes, it was right to call for help but this message should have been sent earlier.

30. No, Hap should try to get Cal out of the coupling before doing anything else.

Question G

Hap gets off the locomotive and goes back to Cal. He pries the coupling with a big crowbar. This frees Cal's right leg. His left leg and pants are still stuck in the coupling. Now the left leg starts to bleed faster.

Just then, you see two other miners come running. Prying together all three of you get the coupling undone. Cal's leg is free. Hap catches Cal and lays him down on the mine floor on his right side. Cal's left leg is still bleeding badly (but not squirting). It looks crooked. It appears a big chunk of flesh has been gouged out of the back of his leg. What should you do for Cal at this time? (Choose only ONE unless you are told to "Try Again!")

31. Check his neck pulse.

32. Immediately put a piece of wire just above his left knee and twist it tight to make a tourniquet.

33. Immediately apply direct pressure to the wound using your hand. Tell one of the others to get the first aid kit off the locomotive.

34. Turn Cal over onto his back. Prop his head and shoulders up and ask him how he feels.

35. Take Cal's left boot off and examine his foot to see if it is injured.

Question H

While you keep pressure on the wound with your hand, you direct one of the other miners to use the scissors from the first aid kit to slit Cal's pants leg so you can see better. Now you can see a gouged out place in his leg the size of two fists. You stuff three large dressings from the first aid kit into the wound and hold them firmly in place. Cal complains that you are hurting him. What should you do? (Choose only ONE unless you are told to "Try Again!")

36. Let up on the pressure on the wound so it doesn't hurt him.

37. Keep the direct pressure on the wound. Tell him you have to maintain pressure to stop the bleeding.

38. As soon as you have the pressure dressings in place, tie two cravats over them loosely.

39. As soon as you have the pressure dressings in place, wrap a coat or a jacket around Cal's lower left leg.

40. Tell your buddies to get the locomotive ready. Then lift Cal onto the top of the locomotive and take him out while continuing to apply direct pressure.

Question I

You keep the dressings firmly in place with your hand. The blood starts to clot and the bleeding nearly stops. Even with the dressings in place the wound hollows deep into Cal's leg. What should you do now? (Choose only ONE unless you are told to "Try Again!")

41. Put another one or two dressings on top of the dressings already in his wound and tie these firmly in place with two cravats. Watch the dressing to see that it doesn't start bleeding again.

42. Have one of your buddies break out the smelling salts and hold these under Cal's nose to keep him alert. Make him sniff the smelling salts even when he complains and coughs.

43. Now that the blood has clotted, let off on the pressure. Use the scissors to cut the pants on his other leg and examine it for injuries.

44. Now that his blood has clotted and the dressings are stuck in his leg wound, lift Cal onto the stretcher board, tie his legs down, and take him out on the locomotive.

45. Leave the dressings in his wound in place. Then slip an air splint over his leg. Blow the splint up to control the bleeding.

Question J

Now you have the pressure dressing tied firmly in place with two cravats. You quickly check Cal for other injuries. Then you and your buddies slip an air splint over Cal's bandaged left leg. Next, you inflate the air splint. He now begins to moan, "Don't hurt me! Don't hurt me!" over and over, and he complains he is cold. He is still lying on his face. You can see his right leg where his pants have been cut by one of your buddies. There is no blood. The leg is bruised, but it looks straight. You run your finger tips along the shin bone. It feels straight and firm. What should you do right now? (Choose only ONE unless you are told to "Try Again!")

46. Put a sterile dressing over the bruise on Cal's right lower leg and then use a second air splint to immobilize this leg too.

47. Ask Cal if the pressure dressing and the air splint are too tight and offer to loosen them if he wants.

48. Pad the stretcher with a folded blanket. Have the other miners help you roll Cal over onto the stretcher on his back. Keep his injured legs and the rest of his body in line. Then cover him with a blanket.

49. Ask Cal to describe what happened, how the accident took place, and who is to blame. This will keep his mind off his problem.

50. Write down the exact time and how long it has been since the accident.

Question K

After Cal is on the stretcher you check on him. His pulse is fast, about 115, and weak. His hands feel cold and damp. He is slow to answer your questions and he acts sleepy. Think about this and Cal's injuries. At this point what is Cal's most serious problem and how should you help him? (Choose only ONE unless you are told to "Try Again!")

51. Possible infection from a dirty, chewing type of wound. You should take extra care to keep the wound dry and clean.

52. Possible injuries to his face, chest, arms, and head. You should unbutton his coveralls and shirt, and look him over carefully for any other injuries.

53. Probable traumatic shock that may kill him. You should keep him warm, and lower his head and chest while elevating the foot end of the stretcher.

54. Probable breathing problems. You should do a finger sweep of his mouth, count his breathing rate, and begin artificial respiration immediately if he passes out.

55. Mental confusion and hallucinations. Keep him awake and talking. Gently slap his face and pinch his cheeks to keep him alert.

Question L

The EMT arrives. She takes over and finishes checking Cal for injuries, immobilizes him on the stretcher, and loads him on the locomotive to take him out. What things should you do to help? (Select as MANY as you think are correct.)

56. Call outside to clear the track all the way out.

57. While the EMT helps Cal, you examine Hap and see if he is OK

58. Answer the EMT's questions. If you think she should know something she doesn't ask about, tell her that information.

59. Offer to go with the EMT to help take Cal out.

60. While the EMT looks at Hap, give Cal small sips of water when he says he is thirsty.

Question M

On your answer sheet, list all the violations of state and federal law, and all the unsafe practices you find in the problem.

End of Problem

Scoring your performance

1. Count the total number of responses you colored in that were marked "correct." Write this number in the first blank on the answer sheet.

2. Count the total number of "incorrect" responses you colored in. Subtract this number from 45. Write the difference in the second blank on the answer sheet.

3. Add the numbers on the first and second blanks. This is your score.

The best score is 60.

The worst score is 0.

Appendix B: Answer Sheet Blanks

These are the answer sheet blanks. Copies of these blank answer sheets may be duplicated in the normal fashion. However, the answers that are found within the brackets must be printed on these blank answer sheets in invisible ink. These answers are found in Appendix C. If you have the capability to print invisible ink, make copies of the blank answer sheets. Make a master of the answers that appear in Appendix C. Then print the invisible ink on the blank answer sheets, being careful to make sure all pages print and that the appropriate answers line up with the appropriate blanks. The Master Answer Sheet shows all the answers in their proper places.

Most companies and trainers prefer to obtain copies of the preprinted answer sheets from MSHA, National Mine Health & Safety Academy, Dept. of Instructional Materials, 1301 Airport Road, Beaver, WV 25813-9426 phone 304-256-3257, fax 304-256-3368 or email to lord-mary@msha.gov.

The exercise is designed to be used in small groups. You will need one answer sheet for each group of 3 to 5 persons in your class. The answer sheets are consumable. You will need a new set for each class.

A developing pen is also needed by each person who marks an answer sheet.

Master Answer Sheet for Motor Supply Accident

Use this answer sheet to mark your selections. Rub the developing pen gently and smoothly between the brackets. Don't scrub the pen or the message may blur. Be sure to color in the entire message once you have made a selection. Otherwise you may not get the information you need.

Question A (Choose only ONE unless you are told to "Try again!")

1. [ ]

2. [ ]
   [ ]

3. [ ]

4. [ ]
   [ ]

5. [ ]

Question B (Choose only ONE unless you are told to "Try again!")

6. [ ]

7. [ ]

8. [ ]
   [ ]

9. [ ]

10. [ ]
    [ ]
    [ ]

Question C (Choose only ONE unless you are told to "Try again!")

11. [ ]

12. [ ]
    [ ]
    [ ]

13. [ ]
    [ ]

14. [ ]
    [ ]
    [ ]

15. [ ]
    [ ]

Question D (Choose only ONE unless you are told to "Try again!")

16. [ ]
    [ ]
    [ ]
    [ ]

17. [ ]
    [ ]

18. [ ]

19. [ ]
    [ ]

20. [ ]
    [ ]

Question E (Choose only ONE unless you are told to "Try again!")

21. [ ]

22. [ ]
    [ ]

23. [ ]
    [ ]
    [ ]

24. [ ]
    [ ]

25. [ ]
    [ ]

Question F (Choose only ONE unless you are told to "Try again!")

26. [ ]
    [ ]
    [ ]
    [ ]

27. [ ]

28. [ ]
    [ ]

29. [ ]
    [ ]

30. [ ]
    [ ]

Question G (Choose only ONE unless you are told to "Try again!")

31. [ ]

32. [ ]
    [ ]

33. [ ]

34. [ ]
    [ ]

35. [ ]
    [ ]

Question H (Choose only ONE unless you are told to "Try again!")

36. [ ]

37. [ ]
    [ ]

38. [ ]
    [ ]

39. [ ]
    [ ]

40. [ ]
    [ ]

Question I (Choose only ONE unless you are told to "Try again!")

41. [ ]
    [ ]

42. [ ]
    [ ]

43. [ ]
    [ ]

44. [ ]
    [ ]

45. [ ]
    [ ]

Question J (Choose only ONE unless you are told to "Try again!")

46. [ ]
    [ ]

47. [ ]
    [ ]

48. [ ]

49. [ ]
    [ ]
    [ ]

50. [ ]

Question K (Choose only ONE unless you are told to "Try again!")

51. [ ]
    [ ]

52. [ ]

53. [ ]
    [ ]
    [ ]

54. [ ]
    [ ]
    [ ]

55. [ ]
    [ ]

Question L (Select as MANY as you think are correct.)

56. [ ]
[ ]
[ ]

57. [ ]
[ ]

58. [ ]
[ ]
[ ]
[ ]

59. [ ]
[ ]
[ ]

60. [ ]
[ ]

Question M

End of Problem

Finding your score

Number of "Correct" answers you colored in = 1) _____

45 minus number of incorrect answers you colored in = 2) _____

Add blanks one and two to get your total score = 3) _____

Highest possible score = 60

Lowest possible score = 0

Appendix C: Invisible ink Answers

These pages contain the answers that must be printed in the blanks of the answer sheet in Appendix B. These answers are spaced and sequenced correctly so that they exactly match up with the appropriate blanks on the answer sheet blank.

Once the answers have been printed in the answer sheet blanks, the developing pen reveals the formerly invisible printed message.

You may obtain preprinted answer sheets or you may prepare your own copies. To learn more about these options, and to determine how many answer sheets and developing pens you will need, see the introductory section of the Instructor's Copy.

Try again!

Try again!

Try again!

Correct. Hap has the tram control on point 3, he has not reversed the motor, and he has the deadman switch held down. Do the next question.

Try again!

Try again!

Try again!

The three feet of wire between the harp and the end of the trolley line will supply enough power to get the locomotive rolling fast. Try again!

Try again!

Correct. Nothing Hap can do will be fast enough to prevent the accident. Cal can't move fast enough to get out of the way. The time to prevent the accident is now past. Do the next question.

Would take too long. Cal may need help fast. Try again!

When Hap does this, the locomotive trams backwards (inby) again, further crushing Cal. The motor still has not been reversed, the control lever is still in point 3, the deadman switch is still under the bag of rock dust. Try again!

Hap does all this. But the coupling between the locomotive and the supply car has engaged. When Hap pulls ahead, the supply car runs over Cal. Try again!

Correct. Hap finds the coupling between the locomotive and the supply car has hooked up. Cal's leg and pants are stuck in the coupling. If Hap had first tried to move the locomotive he could have hurt Cal worse. Do the next question.

Cal continues to scream and struggles to free his legs, but can't get out. Hap's advice is bad. He should stay with Cal. Try again!

Correct. Hap sees both legs. The coveralls on the left leg are soaked with blood from the coupling down to Cal's boot. The calf of the leg is stuck in the coupling. There is no blood visible on the right leg which is pinned just below the knee between the supply car and its tongue. Do the next question.

Not yet. There is something more important that needs to be done first. Try again!

When Hap does this, it pulls the supply car too, and Cal cries out. Try again!

No need to. He is yelling and screaming. There is something more important that needs to be done. Try again!

Hap can't. The trolley pole is off the trolley wire. He needs to do something else first. Try again!

Hap can't. The wound is covered by the coupling. Try again!

Correct. It may take some time to free Cal. He could bleed to death. His bleeding must be controlled. Do the next question.

Because of Cal's heavy pants and coveralls, Hap can't be sure he's found the pressure point. He can't see if his pushing slows the bleeding. The coupling is in the way. Also, he can't get help. Try again!

Cal says he can't sit down. He tells Hap to get him out. This is a poor choice. Try again!

Hap does this, but the bleeding doesn't slow or stop. The leg wound is inside the coupling. This it a poor choice. Try again!

Correct. Now is the right time to call for help and the trolley phone is the fastest way to do so. But Hap forgot to say who he is, where he is, and who is hurt. The mine is large. Others may not know where to send help. Do the next question.

Try again!

Calling for help was the right thing to do at this time. But, there is a problem. Try again!

Hap couldn't call before he put the trolley pole on the wire again. And he needed to control Cal's bleeding first. Try again!

He may need help in getting Cal out. He knows he is stuck tight. It won't take long to call for help. Getting help is important. Try again!

There is something else more critical. Try again!

This stops the bleeding but will cause further injury. Your action may cost Cal his leg. Try again!

Correct. This will help control the bleeding. Do the next question.

This causes Cal to scream. Then he passes out. Your action hurt him more. Try again!

You do so, but it hurts him. He continues to bleed. Your action wastes time and contributes to his injuries. Try again!

When you do he starts bleeding hard again. Try again!

Correct. It is important to maintain the pressure to control the bleeding and it is important to tell Cal what you are doing and why. Do the next question.

When you do, the dressings fall out of place and Cal starts bleeding again. This action harms him! Try again!

Now you can't see if his leg is bleeding, or if the pressure bandages stay in place. He may bleed more and die. Try again!

Cal needs more help first. This is dangerous. He may die before you get him out. He may have other problems. Try again!

Correct. You have now controlled his bleeding. The extra dressings and the cravats will maintain direct pressure. Do the next question!

Cal coughs and thrashes around. You have increased his pain. You should calm him, not annoy him. Try again!

His left leg starts to bleed again. You should keep the direct pressure on the wound while directing someone else to cut his other pants leg. Try again!

As soon as you start moving him, his leg starts bleeding real bad. Your actions have harmed him. Try again!

As you slip the air splint over his leg, you dislodge the dressings in his wound. His leg starts to bleed hard again inside the air splint. Try again!

You waste time doing this. It is not necessary. There is a more critical task that needs immediate attention. Try again!

He says they are too tight and to loosen them. You should not loosen them and you should not have asked him this question in the first place. Try again!

Correct. Do the next question.

When you do this, he gets upset, thrashes around, and screams. Your actions have harmed him more. You need to comfort and calm him, not torment and anger him. Try again!

Not necessary. Wastes time. Try again!

Not an immediate problem though you should always try to keep wounds as clean as possible. Try again!

Not the immediate problem. This action chills him. Try again!

Correct. This simple treatment can save his life. Failure to do this could lead to irreversible shock and later advanced life support treatment may not help him. Do the next question.

Not his immediate problem. The finger sweep is unnecessary and will annoy Cal. He is talking so his airway is open. If he passes out he will likely continue to breathe. Artificial respiration would be harmful. Try again!

Not his main problem. Your actions would not help him and might hurt. Try again!

Correct. Other locomotives and mantrips should be cleared. Also, the unit supply train loading at the surface may block the access road to the mine. If so, it needs to be moved. This will speed Cal's trip out.

Correct. He has been through a lot too. He fell from the locomotive. He could have injuries that need attention. He could also suffer from shock.

Correct. It is important to answer the EMT's questions. But it is also important to volunteer information not asked for by medical personnel. You helped free Cal and have been giving him first aid. You may know other things that the EMT should know.

Correct. The EMT will need helpers on the way out to operate the motor, throw switches, help support the stretcher, etc. Hap should not operate the locomotive.

This can make Cal vomit and deepen his shock. Do not do this! The EMT would stop you if she saw you doing this. Try again!